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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/992,055	11/14/2001	Bruce F. Macbeth	905_132NP	4851

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EXAMINER

TERESINSKI, JOHN

ART UNIT	PAPER NUMBER
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2858

DATE MAILED: 07/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding:

Office Action Summary

Application No.

09/992,055

Applicant(s)

MACBETH ET AL.

Examiner

John Teresinski

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Election filed 28 May 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-55 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 24-43 and 45-55 is/are rejected.
- 7) ☒ Claim(s) 15-23 and 44 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Election/Restrictions

Applicant's amendments to the claims is noted and the requirement to elect a single species as noted in paper 8 is withdrawn. Claims 1-55 will be examined.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,351,011 to Liberman.

Regarding claim 1, Liberman discloses an upstream/downstream discriminator circuit which detects load current fluctuations and line voltage fluctuations (column 2 lines 16-23), detects an upstream even when fluctuations are in phase and detects a downstream transient event when fluctuations are out of phase (column 3 lines 4-36, 50-55, column 4 lines 1-2).

Regarding claim 2, Liberman disclose transient events that produce a high frequency spectrum (column 2 line 39).

Regarding claim 3, Liberman disclose transient events that produce a low frequency spectrum (column 1 lines 39-41).

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liberman in view of U.S. Patent No. 4,539,520 to McBride.

Regarding claim 4, Liberman does not disclose a current transformer to detect steps in load current. McBride disclose that it is well known to detect steps in load current within a current transformer (column 1 lines 19-21). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a current transformer as taught by McBride into Liberman for the purpose of providing a remote current sensor at a distant location (column 1 lines 13-20).

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liberman in view of U.S. Patent No. 4,434,509 to Blades.

Regarding claims 6 and 7, Liberman does not disclose a high pass filter or a microprocessor. Blades discloses that it is well known in detecting arcing to utilize a high pass filter and microprocessor to detect steps in line voltage (column 21 lines 18-42). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the high pass filter and microprocessor as taught by Blades into Liberman for the purpose of providing a convenient means of acquiring high frequency noise (column 21 lines 18-42).

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Claims 5,8-13,31,32, 34-37 41-43, 46-48, 50, 53-55 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liberman in view of U.S. Patent No. 4,922,368 to Johns.

Regarding claim 5, Liberman does not disclose an impedance in series with a power line. Johns disclose detecting steps in load current across an impedance in series with a power line (column 6 lines 27-42). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include an impedance element as taught by Johns into Liberman for the purpose of providing an output voltage indicative of current (column 6 lines 35-42).

Regarding claim 8, Liberman does not disclose out of phase steps in line voltage and load current produced by an upstream line impedance. Johns discloses out of phase steps in line voltage and load current produced by an upstream line impedance (column 11 lines 52-68, column 12 lines 44-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include out of phase steps produced by upstream impedance as taught by Johns into Liberman for the purpose of establishing the proper direction of a fault.

Regarding claims 9 and 10, Liberman does not disclose an inherent or introduced line impedance for producing a voltage drop. Johns discloses an inherent (column 5 lines 55-64) and introduced line impedance (column 10 lines 55-64) for producing a voltage drop. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include an inherent and introduced voltage drop as taught by Johns into Liberman for the purpose of producing accurate measurements by properly accounting for line characteristics.

Regarding claims 11 and 41-43, Liberman does not disclose indicating whether an arc fault is located in a branch circuit portion or located in the remainder of an electrical distribution system. Johns disclose a discriminator for comparing voltage and current fluctuations (column 6

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lines 27-42) for indicating whether an arc fault (column 4 lines 65-68, column 5 lines 1-13) is located in a branch circuit portion or located in the remainder of an electrical distribution system (column 12 lines 17-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include indicating the location of an arc fault as taught by Johns into Liberman for the purpose of avoiding unnecessary shutdowns (column 1 lines 9-21).

Regarding claims 12 and 37, Liberman does not disclose an interrupting mechanism that does not disconnect the load from the electrical distribution system when the fault is located in the remainder of the distribution system. Johns discloses an interrupting mechanism that does not disconnect the load from the electrical distribution system when the fault is located in the remainder of the distribution system (column 11 lines 34-44). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the disconnecting mechanism as taught by Johns into Liberman for the purpose of preventing unnecessary disconnections.

Regarding claim 13, Liberman discloses contrary step directions with respect to arc faults occurring in the remainder of the electrical distribution system (column 3 lines 4-36, 50-55, column 4 lines 1-2).

Regarding claims 31, 32, 34 and 35, see claim 5 above.

Regarding claim 36, Liberman discloses a device responsive to either polarity (column 1 lines 64-67).

Regarding claims 46-48 and 50, Liberman does not disclose an inductive load coupled to the detector. Johns discloses an inductive load coupled to the detector (column 6 lines 27-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to

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include an inductive load coupled to the detector as taught by Johns into Liberman for the purpose of providing an optimal frequency range for measurements (column 6 lines 43-51).

Regarding claims 53-55, see claims 8-10 above.

Claims 24-30, 33, 38-40, 45, 51, 52 and 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liberman and Johns as applied to claim 11 above, and further in view of U.S. Patent No. 4,434,509 to Blades.

Regarding claims 24 and 25, Liberman as modified does not disclose a microprocessor or pre-determined hold times. Blades discloses that it is well known in detecting arcing to utilize a microprocessor to detect steps in line voltage (column 21 lines 18-42) and pre-determined hold times (column 22 lines 40-49). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the high pass filter and microprocessor as taught by Blades into Liberman as modified for the purpose of providing a convenient means of acquiring high frequency noise (column 21 lines 18-42).

Regarding claims 26, 27 and 45, Liberman as modified does not disclose zero cross detectors to determine a phase relationship between line voltage and line current. Blades discloses zero cross detectors to determine a phase relationship between line voltage and line current (column 15 lines 18-38). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the high pass filter and microprocessor as taught by Blades into Liberman as modified for added feature detecting regardless of load reactance (column 15 lines 20-23).

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Regarding claims 28-30, Liberman as modified does not disclose an analog to digital converter connected to load current sensor. Blades discloses an analog to digital converter connected to load current sensor (column 23 lines 53-57). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the high pass filter and microprocessor as taught by Blades into Liberman as modified for added desirability of digital processing.

Regarding claim 33, Liberman as modified does not disclose a high pass filter or a microprocessor. Blades discloses that it is well known in detecting arcing to utilize a high pass filter and microprocessor to detect steps in line voltage (column 21 lines 18-42). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the high pass filter and microprocessor as taught by Blades into Liberman as modified for the purpose of providing a convenient means of acquiring high frequency noise (column 21 lines 18-42).

Regarding claims 38-40, Liberman as modified does not disclose current and voltage fluctuations exclusively associated with arc extinguishing or that occur during each half cycle. Blades discloses that it is well known for current and voltage fluctuations to be exclusively associated with arc extinguishing and fluctuations that occur during each half cycle (column 4 lines 44-64). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the limitations as taught by Blades into Liberman as modified for the purpose of accurately detection arc faults based on arc characteristics.

Regarding claims 51 and 52, Liberman as modified does not disclose a high pass filter or a microprocessor. Blades discloses that it is well known in detecting arcing to utilize a high pass

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filter and microprocessor to detect steps in line voltage (column 21 lines 18-42). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the high pass filter and microprocessor as taught by Blades into Liberman as modified for the purpose of providing a convenient means of acquiring high frequency noise (column 21 lines 18-42).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liberman and Johns as applied to claims 11 and 13 above, and further in view of U.S. Patent No. 5,572,138 to Nimmersj"o.

Regarding claim 14, Liberman as modified does not disclose differentiating sensors. Nimmersj"o discloses a method for determining the direction of a fault including differentiating sensors (column 3 lines 31-37). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include differentiating sensors as taught by Nimmersj"o into Liberman as modified for the purpose of accurately determining the location of a fault.

Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liberman and Johns as applied to claims 1 and 46 above, and further in view of McBride.

Regarding claim 49, Liberman as modified does not disclose a current transformer to detect steps in load current. McBride disclose that it is well known to detect steps in load current within a current transformer (column 1 lines 19-21). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a current transformer as

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taught by McBride into Liberman as modified for the purpose of providing a remote current sensor at a distant location (column 1 lines 13-20).

Allowable Subject Matter

Claims 15-23 and 44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance:

Regarding claims 15:

The primary reason for indicating allowable subject matter of claim 15 is the inclusion of di/dt sensor converts steps into di/dt pulses, dv/dt sensor converts steps into dv/dt pulses and identification of the direction from polarities of leading edges of the pulses. It is these features found in the claim, as they are claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

Claims 16-23 are indicated allowable due to their dependency on claim 15.

Regarding claim 44:

The primary reason for indicating allowable subject matter of claim 44 is the inclusion of a range of harmonics from its fundamental frequency to its 10th harmonic. It is these features

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found in the claim, as they are claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following are cited to further show the state of art with respect to arc fault detection methods and devices in general:

U.S. Patent No. 5,432,455 to Blades discloses a method and apparatus for detecting arcing by monitoring high frequency noise.

U.S. Patent No. 4,438,475 to Haley discloses a protective relay apparatus for determining the direction of a fault on a power line.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Teresinski whose telephone number is (703) 305-4746. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, N. Le can be reached on (703) 308-0750. The fax phone numbers for the

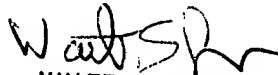
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organization where this application or proceeding is assigned are (703) 872 9319 for regular communications and (703) 872 9318 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

ST
JT

July 14, 2003


WALTER E. SNOW
PRIMARY EXAMINER